

STORMWATER MANAGEMENT SYSTEM OPERATIONS AND MAINTENANCE MANUAL

FOR

**BEAUPORT GLOUCESTER HOTEL
COMMERCIAL STREET
GLOUCESTER, MA
DECEMBER 14, 2012**

Prepared for:

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Table of Contents

A. Introduction

B. Maintenance Program

- .1 Inspection and Maintenance Frequency and Corrective Measures
 - .1.1 Routine Maintenance Tasks
 - .1.2 Illicit Discharges
 - .1.3 Parking Lot Sweeping
 - .1.4 Catch Basins and Manholes
 - .1.5 Stormceptor Unit
 - .1.6 Infiltration System – Storm Tech Recommendations
- .2 Winter Maintenance Program
- .3 Fertilizer Selection and Use
 - .3.1 Fertilizer Selection
 - .3.2 Fertilizer Storage
 - .3.3 Fertilizer Application

C. Appendices

Appendix A – Stormwater Management System Site Plan

**Appendix B – Stormwater Management System Maintenance Program
Summary Checklist**

**Appendix C – Stormwater Management System Operation and Maintenance
Forms**

A.0 Introduction

Stormwater management facilities are commonly installed in development projects such as the proposed Beauport Gloucester Hotel. The complexity and goals of these systems vary with the nature of the receiving water as well as the type of development proposed. In general, stormwater runoff from developed areas contains a number of contaminants which can have an adverse impact on receiving waters. The installation of stormwater management systems that are properly designed, installed and maintained can significantly reduce the non-point discharge from developed areas. These measures are particularly important to project in sensitive water bodies.

The stormwater management system can protect and enhance the stormwater runoff water quality through the removal of sediments and pollutants, and source control significantly reduces the amount of pollutants entering the system. Preventative maintenance of the system will include a comprehensive source reduction program of regular vacuuming and litter removal, prohibitions on the use of pesticides and maintenance of designated waste and recycling areas.

This long-term Stormwater Management System Operations and Maintenance (O&M) Manual, filed with the City of Gloucester, shall be implemented at the Beauport Gloucester Hotel development site located on Commercial Street to ensure that the stormwater management system functions as designed. The Owner possesses the primary responsibility for for overseeing and implementing the O&M plan and assigning a property manager who will be responsible for the proper operation and maintenance of the stormwater structures.

In case of the transfer of property ownership, future property owners shall be notified of the presence of the stormwater management system and the requirements for proper implementation of the O&M plan. This project is also subject to an Order of Conditions from the Gloucester Conservation Commission, a copy of which will be recorded at the Essex County Registry of Deeds and will run with the property to future owners.

Included in this manual is an overall site plan which identifies the locations of the key components of the stormwater management system and a log for tracking the inspections and maintenance.

A.1 Responsibility

The purpose of the Stormwater Operations and Maintenance Manual is to ensure the inspection of the system, removal of accumulated sediments, oils and debris, and implementation of corrective action and record keeping activities. The ongoing responsibility is the Owner, its successors and assigns. Adequate maintenance is defined in this document as good working condition.

Contact information is provided below:

Responsibility for Operation and Maintenance

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A.2 Documentation

An Inspection and Maintenance Record Log and Schedule shall be kept by the Owner or Property Manager summarizing inspections, maintenance, repairs and any corrective actions taken. The log will include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. Inspection and Maintenance Logs shall be kept on file at the property management office.

B.0 Maintenance Program

The Owner, Property Manager and maintenance staff shall conduct the Operation and Maintenance program set forth in this document. The Owner or Property Manager will ensure that inspections and record keeping are timely and accurate and that cleaning and maintenance are performed in accordance with the recommended frequency for each stormwater component. Inspection and Maintenance Log Forms (provided herein) shall include the date and amount of the last significant

storm event in excess of on (1) inch of rain in a 24-hour period, physical conditions of structures, depth of sediment in structures, evidence of overtopping or debris blockage and maintenance required of each structure. The estimated annual cost of the Maintenance Program is \$1,500 to \$3,000.

B.1 Inspection and Maintenance Frequency and Corrective Measures

The following areas, facilities and measures will be inspected by the Owner or Property Manager and maintained as specified below. Identified deficiencies will be corrected. Accumulated sediments and debris will be properly handled and disposed of off-site, in accordance with local, state and federal guidelines and regulations. Refer to the attached Stormwater Management O&M Plan for the location of the components of the stormwater management system.

B.1.1 Routine Maintenance Tasks

- Routine maintenance of lawns, gardens, and other landscaped areas shall occur as necessary to maintain the property in a neat and orderly fashion. Clippings and/or mulch shall not be washed into the drainage infrastructure.
- Maintenance of the Stormwater Management System shall be in accordance with the Operations and Maintenance Checklist below.
- Snow shall be removed from the site as it accumulates. There is no snow storage plan for this site.
- Good housekeeping – all areas should be kept free of trash and debris. Any storage of materials and waste products shall be inside or under cover. Fertilizers, herbicides and pesticides, if stored on site, shall be stored properly contained and under cover. Storage of salt or deicing chemicals, if any, shall be on impervious area, covered and protected from runoff.

B.1.2 Illicit Discharges

During construction, and all illicit connections from the property shall be cut and capped. The proposed site stormwater management system shall be checked for signs of illicit discharge during regular operation and maintenance activities. This will include but not be limited to checking

for connections other than stormwater to the drainage system. Should connections other than stormwater be found, they will be immediately removed.

B.1.3 Parking Lot Sweeping

One effective nonstructural source control is street and parking lot sweeping. Many municipalities and some private entities (e.g., commercial shopping areas or office parks) have street sweeping programs. Although intended to provide important nonpoint source pollution control, many street sweeping programs are not effective at capturing the peak sediment loads.

There are three factors in particular that can have a major influence on the effectiveness of a street sweeping program: access, the type of sweeper, and the frequency of sweeping.

Effective sweeping requires access to the areas to be swept. Parked cars impede street sweeping. Studies have shown that up to 95% of the solids on a paved surface accumulate within 40 inches of the curb, regardless of land use. It is essential that applicants or those responsible for stormwater maintenance have the ability to impose parking regulations to facilitate proper sweeping, particularly in densely populated or heavily traveled areas, so that sweepers can get as close to curbs as possible.

A good street sweeping program requires an efficient sweeper. There are three types of sweepers: Mechanical, Regenerative Air, and Vacuum Filter. Each has a different ability to remove TSS.

- **Mechanical:** Mechanical sweepers use brooms or rotary brushes to scour the pavement. Although most of the sweepers currently in use in Massachusetts are mechanical sweepers, they are not effective at removing TSS (from 0% to 20% removal). Mechanical sweepers are especially ineffective at picking up fine particles (“fines”) (less than 100 microns).
- **Regenerative Air:** These sweepers blow air onto the road or parking lot surface, causing fines to rise where they are vacuumed. Regenerative air sweepers may blow fines off the vacuumed portion of the roadway or parking lot, where they contaminate stormwater when it rains.
- **Vacuum filter:** These sweepers remove fines along roads. Two general types of vacuum filter sweepers are available - wet and dry. The dry type uses a broom in combination with the vacuum. The wet type uses water for dust suppression. Research indicates vacuum sweepers are highly

effective in removing TSS.

Regardless of the type chosen, the efficiency of street sweeping is increased when sweepers are operated in tandem.

The frequency of sweeping is a major factor in determining efficiency. Unlike other stormwater treatment practices that function whenever it rains, street sweeping only picks up street dirt when streets and parking lots are actually swept. TSS removal efficiency is determined based on annual loading rates. If a road were swept only once a year with a sweeper that is 100% efficient, it would remove only a small fraction of the annual TSS load.

Street dirt accumulates on roads and parking lots and runs off in response to precipitation. The average interval between precipitation events in Massachusetts is approximately 3 days. Therefore, the hypothetical maximum effectiveness for street dirt removal requires sweeping at least once every 3 days, with a street sweeper with 100% efficiency at removing solids on paved surfaces before they become suspended. Modeling studies by Claytor (1999) in the Pacific Northwest suggest that optimum pollutant removal occurs when surfaces are swept every two weeks.

B.1.4 Catch Basins and Manholes

Regular maintenance is essential. Deep sump catch basins remain effective at removing pollutants only if they are cleaned out frequently. Once 50% of the sump volume is filled, the catch basin may not be able to retain additional sediment.

Inspect or clean deep sumps at least four times per year and at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.

Clamshell buckets are typically used to remove sediment; however, vacuum trucks are preferable as they remove more trapped sediment than clamshells. Vacuuming is also a speedier process and is less likely to damage the hood within the deep sump catch basin.

Always consider the safety of the staff cleaning deep sump catch basins.

Cleaning a deep sump catch basin within a road with active traffic or even within a parking lot is dangerous and a police detail may be necessary to safeguard workers.

Although catch basin debris often contains oil and hazardous material such as petroleum hydrocarbons and metals, MassDEP classifies them as solid waste. Unless there is evidence that they have been contaminated by a spill or other means, MassDEP does not routinely require catch basin cleanings to be tested before disposal. Contaminated catch basin cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000, and handled as hazardous waste.

In the absence of evidence of contamination, catch basin cleanings may be taken to a landfill or other facility permitted by MassDEP to accept solid waste, without any prior approval by MassDEP; however, some landfills may require testing before they are accepted.

B.1.5 Stormceptor Unit

Much like the catch basins, regular maintenance of the Stormceptor units is essential. The maintenance of these units begins immediately at post-construction prior to putting the unit into service. During the first year of operation, the units should be inspected quarterly in order to determine the rate of accumulation of sediment and oils. In subsequent years, the units can be inspected at a frequency determined by the accumulation rate of sediment and oils, but in no cases should the inspection frequency exceed six months.

Cleaning of the units is required when the sediment has accumulated to 15% of the Stormceptor's capacity. The unit should also be cleaned immediately in the event of a spill.

B.1.6 Infiltration System – Storm Tech Recommendations

Regular inspection and maintenance are essential to assure a properly functioning system. Inspection is accomplished through the five (5) inspection ports. These inspection ports allow inspection to be accomplished from the surface without the need for confined space entry. A stadia rod may be inserted to determine the depth of sediment. If upon visual inspection it is found that sediment has accumulated to an average depth exceeding three (3) inches, cleanout is required.

The system should be initially inspected immediately after the completion of the site's construction. While every effort should be made to prevent sediment from entering the system during construction, it is during this time that excess amounts of sediments are most likely to enter and stormwater system. Inspection and maintenance, if necessary should be performed prior to the contractor passing responsibility over to the site's owner. Once in normal service, the system should be inspected bi-annually until an understanding of the site's characteristics is developed. The site's maintenance manager can then revise the inspection schedule based on experience or local requirements.

The system proposed for this site does not include an isolator row. Because of the lack of an isolator row, cleaning of the system in general will be very difficult due to minimal access to the majority of the components. Due to the system's upstream tributary area (rooftops and upper hotel deck areas only) excess sedimentation is not anticipated to occur once construction has been completed. Regular inspections will verify this understanding.

B.2 Winter Maintenance Program

Ensure structures are not blocked by ice, snow, debris or trash during winter months. This project site does not feature snow storage areas. Snow is to be removed from the site as it accumulates.

B.3 Fertilizer Selection and Use

The goal of fertilizer use should be to enhance the ground cover of the facility, yet not result in adverse water quality impacts. The following guidelines are recommended.

B.3.1 Fertilizer Selection

The selection of fertilizer should be based upon site-specific requirements. Recommendations for the fertilizer will be made upon completion of the project and actual tests of the soil mix. The benefit of the use of a soil mix is the ability of the soil to absorb and store nutrients for subsequent plant growth better than a sandy loam.

It is recommended that the soil be resampled every three (3) years and the plan adjusted accordingly.

The project location is in a sensitive natural area; therefore only slow-release organic low phosphorus fertilizers shall be used in any landscaped areas to limit the amount of nutrients that could enter the stormwater management system.

B.3.2 Fertilizer Storage

Fertilizer should be stored in a weatherproof area with containers protected from damage. Fertilizer from any damaged containers should be placed in appropriate weatherproof containers.

B.3.3 Fertilizer Application

Fertilizer should be applied with appropriate mechanical equipment properly calibrated to meet the recommended application rates of the soil tests and manufacturer. The Owner or his agents should instruct personnel on the use of equipment and the proper measurement of the fertilizer.

Personnel assigned to application should be instructed that over-application of fertilizer is adverse to the landscaped areas and environment. Fertilizer should not be applied to steep slopes, saturated ground, during periods of precipitation, or immediately prior to major rain events.

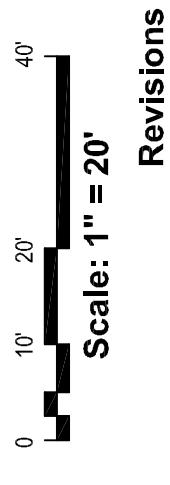
Appendix A

Stormwater Management System Site Plan

**BEAUPORT
GLOUCESTER
HOTEL**

**BEAUPORT
GLOUCESTER, LLC**
6 ROWE SQUARE
GLOUCESTER, MA

Drawing Issue	Date



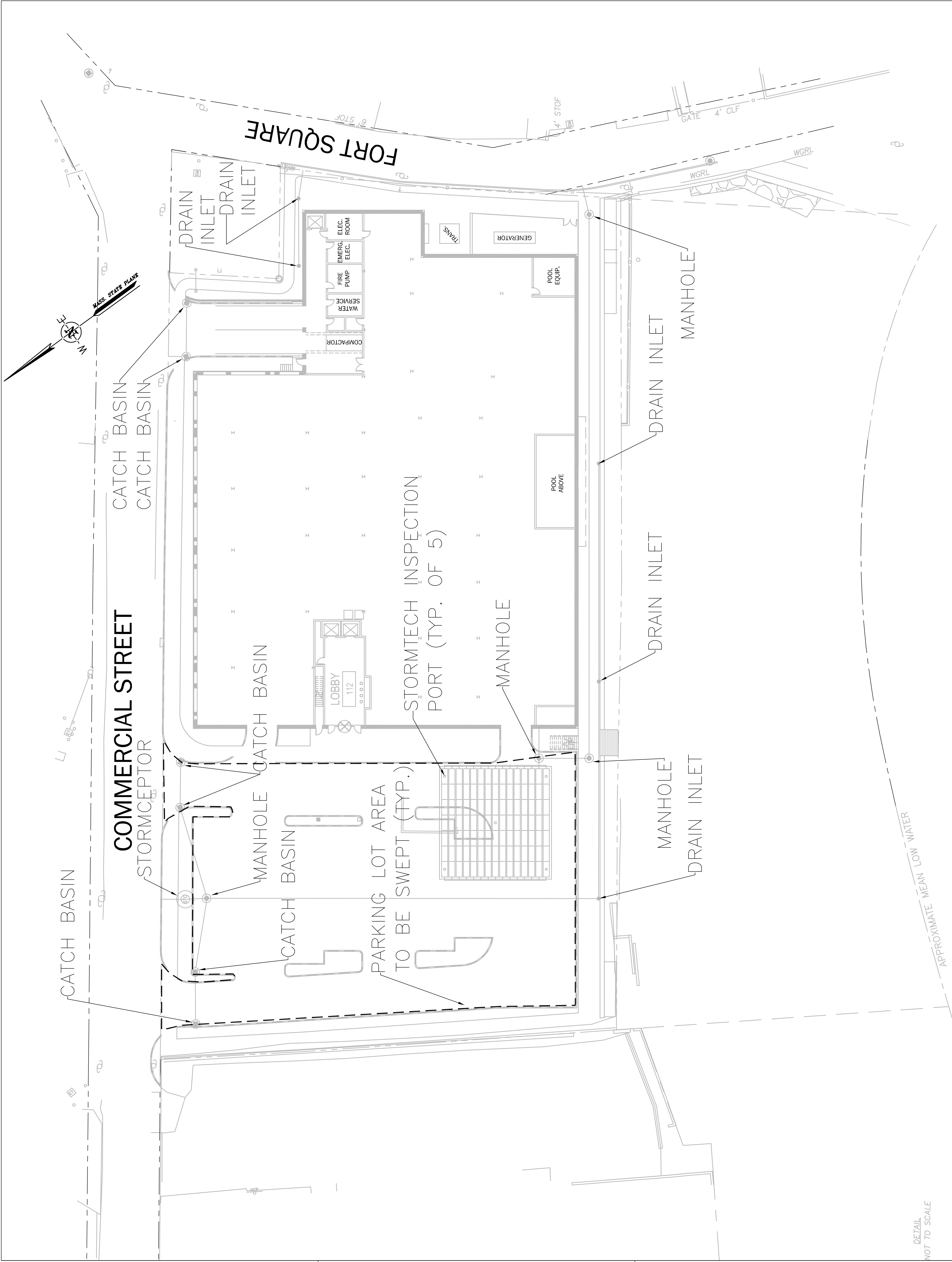
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**Stormwater O & M
Plan**

Sheet

C-1000



DETAIL
NOT TO SCALE

Appendix B

Stormwater Management System Maintenance Program Summary Checklist

Stormwater Management System Maintenance Program Summary Checklist					
Item	Commentary	Frequency			
		Monthly	Quarterly	Semi-Annual	Annual
Parking Lot Sweeping	Sweep to remove small debris and sediments; large debris should be removed by hand prior to sweeping actions.	X			
Catch Basins and Manholes	Inspect for sediment quarterly; inspect at tend of foliage and at end of snowmelt; remove upon accumulation		X		
Stormceptor Unit	Inspect monthly for first six months; inspect for sediment accumulation quarterly of semi—annually thereafter; inspect immediately after spills		X	X	
Infiltration System	Inspect for accumulated sediment immediately after construction; inspect semi-annually thereafter			X	

Appendix C

Stormwater Management System Operation and Maintenance Forms

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BEAUPORT GLOUCESTER HOTEL

Inspector's Signature: _____

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BEAUPORT GLOUCESTER HOTEL

Inspector's Signature: _____

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BEAUPORT GLOUCESTER HOTEL

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